

THE STATUS AND NEEDS OF
MEDICAL SCHOOL LIBRARIES IN THE UNITED STATES
A REPORT

Prepared for
The National Library of Medicine

by

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OFFICE OF THE
COMMISSIONER OF PATENTS
AND TRADEMARKS

This paper, prepared at the request of the National Library of Medicine, is the result of a study of the status and needs of the libraries of the 86 medical schools and schools of basic medical sciences approved by the American Medical Association. It is intended to summarize the impact of changing requirements in medical research, education, and practice on the collections, services, housing, and staffs of medical school libraries.

Such data as are presented have been gathered from the literature, from source materials in the files of the National Library of Medicine and the Library Services Branch, U. S. Office of Education, and from replies to a specially prepared questionnaire. The questionnaire sent annually to institutions of higher education by the Library Services Branch, U. S. Office of Education, was modified to apply specifically to medical school libraries and was mailed to the 86 libraries and vigorously followed-up by telephone calls. This methodology yielded a response of 97 percent and resulted in data which seem to be the most comprehensive and reliable to have been collected for medical school libraries. The fiscal year 1960/61 was chosen as the most recent year for which complete statistics would be available.

A word about the homogeneity of the population: it is true that these 86 libraries serve institutions of greatly varying size and constitution. There are libraries of great urban medical centers and those of smaller, so-called "free standing" medical schools, not connected with a university. The clientele differs in that many of these libraries are the libraries of schools of public health, nursing, dentistry, rehabilitation, and other related health fields as well as medicine. Some serve undergraduates in biology, and some serve graduate students in the basic sciences. These differences in the population, however, are not significant. Each library exists to perform services to an institution concerned with medical education, research, and patient care. If we have standards in these three areas, then there are standards, or potential standards for the libraries serving all medical schools in the United States. These standards are not affected by size of clientele, nor in these days of "comprehensive medicine," in which the concern is with the whole individual in his setting, are they significantly affected by diversity of interest in the health fields. In the medical center library (that library which serves a medical school together with its associated research and patient care facilities) it is not possible to differentiate between library resources and services needed to support education, research, or patient care.

The characteristics of the scientific revolution can be stated briefly as these: the growth of research and new knowledge, specialization, and multi-disciplinary science. The importance and magnitude of the revolution in medicine in the United States have been duly noted in several government publications, notably the Bayne-Jones Report¹ of 1958, the Bane Report² of 1959, and the Jones Report³ of 1960. External social and economic changes are these:

1. A greater birth rate and a longer life expectancy.
2. The cumulation of new knowledge, thus increasing the possibilities for further investigation.
3. National economic growth and change making medical care available to more people. The growth of hospital utilization.

All this shows itself in an increased need to train physicians and medical investigators. In the United States today there is an acute shortage of physicians. The Bane Committee estimated that medical school admissions must increase by 50 percent over the present number by 1971 if we are to maintain the present ratio of physicians to population. This increase has and will continue to result in new schools of medicine, in expanded student enrollments, and in accelerated curricula. New knowledge begets more new knowledge which adds to the flood of new research results and will produce thousands of new investigators to use the information, hence the exponential growth curve.

As great as these quantitative changes are, there have been important qualitative changes in medical education. Curricula have broadened in

- 1 U.S. Dept. of Health, Education, and Welfare. The advancement of medical research and education through the Department of Health, Education and Welfare. Final report of the Secretary's Committee on Medical Research and Education. June 27, 1958. Washington, D. C., 1958, 82 p.
- 2 U.S. Public Health Service. Physicians for a growing America. Report of the Surgeon General's Consultant Study Group on Medical Education. October 1959. Washington, D. C., 1959. (PHS Publ. No. 709). 96 p.
- 3 U. S. Senate Committee on Appropriations. Subcommittee on Departments of Labor and Health, Education, and Welfare. Committee of Consultants on Medical Research. Federal support of medical research. Report of the Committee... May 1960. Washington, D.C., 1960. 133 p.

scope and depth. New subject areas have been incorporated as knowledge increases. Undergraduates are more involved in research. The student must absorb the total body of science and then be responsible for keeping up with new knowledge. Continuing education has increased in importance. It is no longer the medical undergraduate alone who must be educated, but the practicing physician, whether by formal or by informal programs. Clinical medicine today has become so highly scientific that it is essential to "bring the laboratory bench next to the bedside."⁴ The gap between bench and bedside must be narrowed if today's practitioner is to make useful applications of the results of research.

The total national expenditure for medical research has been increased from \$45 million in 1940 to \$148 million in 1950 to \$715 million in 1960. Projections for 1970 give \$3 billion for total national expenditure for medical research. In terms of a constant value dollar this increase is still great.

"The number of professional workers engaged full or part-time in medical research has risen from over 19,000 in 1954 to nearly 40,000 in 1960 - more than a 100 percent increase. The dominant characteristics of this growth can be summarized briefly:

1. The largest increase has taken place in universities and research institutes;
2. The number engaged full time in medical research has been rising, and those working part-time are devoting a larger share of their energies to research;
3. Research opportunities combined with teaching and/or service responsibilities have become increasingly attractive to M. D.'s;
4. Participation of Ph. D. -trained manpower has been rising rapidly, accompanied by the growing involvement of the physical and social and behavioral sciences in medical research;
5. The underlying supportive force in their development has been the substantial enlargement of national

⁴ Dryer, Bernard V. "Lifetime learning for physicians: principle, practices, proposals". J. Med. Educ. 37 (6, pt. 2): 16, June 1962.

programs for private and public support of research, research training, and construction of research facilities."⁵

The Bayne-Jones Committee estimated that there would be some 25,000 new medical researchers by 1970 and that the necessary annual expenditure per man would have risen by 40 percent between 1958 and 1970.

The significance of the Federal government in this picture is made graphic by the Jones Committee which found that Federal support of medical research has risen from 7 percent of the total in 1940 to 53 percent in 1960. Federal outlays for the performance of medical and health-related research amounted to \$494 million in 1960; in 1962 the outlay will be \$857 million, an increase of nearly 75 percent in only two years. The estimate for 1963 exceeds \$1 billion, an increase of almost 20 percent in only one year.⁶

The impact on the university, and on the medical school, is dramatic. Nearly three-fourths of the Federal expenditure is spent through grants and contracts to research performers, largely universities.⁶ As an example, of the \$17,011,000. spent for sponsored research at New York University in the academic year 1960/61, \$13,837,000., or 81.3 percent, was Federal funds, and \$6,880,000. or 49.7 percent, of these Federal funds went to their Medical Center.⁷

The research grants programs of the National Institutes of Health, Public Health Service, supported 1,695 projects in 1951. In 1961 the NIH granted funds for 13,500 projects. These research projects reach into a large number of subject areas. The most recent subject matter index to the grants program⁸ lists grant titles under approximately 7,000 subject headings. This publication is itself a document of 681 pages.

5 U. S. National Institutes of Health. Manpower for medical research; requirements and resources, 1965-70. Summary of a report submitted to the Subcommittee on Departments of Labor and Health, Education, and Welfare, and related agencies appropriations of the Committee on Appropriations, House of Representatives. Washington, D. C., Public Health Service, 1962. 9 p.

6 U. S. Public Health Service. Resources for medical research. Report No. 1. Washington, D. C., 1962. (PHS Publ. No. 969). 15 p.

7 New York University. Office of Research Services. Sponsored research at New York University 1960-1961. New York, 1962. 95 p.

8 U. S. National Institutes of Health. Division of Research Grants. Research grants index, fiscal year 1961. Bethesda, 1962. (PHS Publ. No. 925). 681 p.

The changes and growth rates enumerated above have had a profound effect on bio-medical communications. Communication is the interchange of information - the very life blood of the medical sciences. The quality of medical research and medical care is largely dependent on the efficiency of this communication.

Three factors have worked together to complicate the communications picture:

1. The exponential growth of the scientific literature.
2. The difference in the kind of requirements for communications due to the rapid growth of multi-disciplinary research.
3. The requirement for speed in dissemination and retrieval.

Scientists approach information in different ways and use different sources. Voigt has summarized studies on the information gathering habits of scientists as follows: The most important source of information is obtained from printed sources that were "come upon...as part of a regular or irregular practice of browsing through or reading the most important journals in the immediate field of interest. The second most important means of locating printed information appears to be the result of the recommendations of colleagues."⁹ The researcher's own memory is next in importance, followed by citations found in books and periodical articles. Next is published indexes and abstracts.

The medical library is the traditional and best established agency for the storage and dissemination of medical information in the United States. This country's aggregate medical school libraries possess a collection of almost 6 million books, periodical volumes, and other library materials. This vast resource represents an investment of approximately \$270 million.¹⁰ It is estimated that these libraries occupy space worth approximately \$26 million. In the fiscal year 1960/61, the total operating budgets of these libraries was in excess of \$5 million.

9 Voigt, Melvin J. Scientists' approaches to information. Chicago, American Library Association, 1961. (ACRL Monograph, No. 24). 81 p.

10 Based on the formula of the valuation of collections of the National Library of Medicine.

Measurements of Library Response

To what extent have medical school libraries kept pace with the increased requirements demanded of them? It is clear that the medical library is very much involved, or is potentially very much involved, in biomedical communication. In the following sections it will be shown that, as a result of chronic inattention, the medical school library is woefully inadequate to meet the demands placed upon it as an agency of biomedical communication, and that the major investment made by society in these libraries is in jeopardy. Financial support has not kept pace with the increased demands; indeed, there is evidence that the library's share of support is shrinking. The quality of medical education, research, and patient care is thereby threatened.

1. Collections

Table 1 presents quantitative data gathered for this report on the present status of library collections.

No set of standards for the composition of medical library collections has been developed. The precise contents of these collections will differ somewhat from one institution to another. One can, however, cite certain broad criteria which should apply to all medical school libraries. Three medical librarians have recently offered suggestions as to size of library collections. Rogers of the National Library of Medicine wrote, "A reasonable standard for a medical library capable of supporting research at its present accelerated level would be 100,000 volumes."¹¹ Esterquest of the Harvard Medical School stated the following: "At present, the middle group of medical school libraries of the state . . . falls short of national standards, which suggest collections of approximately 100,000 volumes as being necessary to meet the needs of a medical school community of good quality."¹² Meyerhoff of the Medical Library Center of New York states the following: "Generally

¹¹ Rogers, Frank B. Unpublished data.

¹² Esterquest, Ralph T. Proposals for strengthening medical library resources and services in New York State. Albany, New York State Library, 1962. 39 p.

Table 1. - Distribution of library volumes of medical schools
in the United States, 1960-61.

Informational item	Number of institutions included	Maximum number reported by any institution	Third quartile	Median	First quartile	Minimum number reported by any institution
Volumes at end of year	84	340,446	77,083	54,779	36,000	12,000
Volumes added during year	83	11,840	4,276	2,647	1,251	400
Periodicals currently received	82	4,120	1,223	992	779	236

there is some consensus among medical librarians that a medical school collection should have a minimum of 100,000 volumes and 1,200 to 1,500 journals currently received."¹³

Table 1 shows that fewer than 25 percent of the libraries have met the suggested standard for number of volumes. In fact, half of the libraries only meet the standards half-way. We also see that only 25 percent of the libraries approach the suggested standard for periodicals currently received.

It should be stressed that these suggested standards are merely minimum. A book collection of 100,000 volumes is not a large library, and a subscription list of 1,500 journals is small when one realizes the total output of medical periodicals. The National Library of Medicine recently issued a list of biomedical serials published between 1950 and 1960.¹⁴ The list contains 8,939 titles, and at that it is a selected list - selected from the 18,500 titles in the NLM. It is estimated that 5,711 of these titles were live and being published at the end of 1960. Since the beginning of the century, the number of medical journals published has quadrupled.

These suggested standards also apply only for today - 1962. In a year the requirements will have changed again. Not only is there a spiraling increase in the literature output but there is a steady increase in the price of library materials. The average annual price for a U. S. medical periodical has increased as follows:¹⁵

1950 -	\$ 7.74
1951 -	8.09
1960 -	10.28
1961 -	11.19

Medical books have increased in price as follows:¹⁵

13 Meyerhoff, Erich. Personal communication.

14 Biomedical serials, 1950-1960. Washington, D. C., National Library of Medicine, 1962.

15 U. S. Office of Education. Library Services Branch. The cost of library materials, by Frank L. Schick and William H. Kurth. Washington, D. C., 1961. (Library Statistics OE-152029 A).

1947-1949 - \$ 6.36
 1960 - 8.41
 1961 - 9.40

There is no end in sight for this trend toward increased production and cost. Library support which is insufficient one year will be compounded the next year.

The selection of items to be added to library collections becomes increasingly complex. Modern medicine and the related health professions embrace both the physical sciences (chemistry, physics, mathematics, engineering), the biological sciences, and the behavioral sciences (psychology, sociology, anthropology). A current usage study at Yale¹⁶ shows that a surprisingly large use is being made of materials in their relatively small sociology collection, surprising in that it is somewhat out of proportion to the use of the rest of the collection. Hetzner of the University of Nebraska reports, "One of the ways in which we notice the impact of increased research and changing methods of medical education is the inability of the University of Nebraska College of Medicine Library to meet requests for widely varying materials in a multitude of subject fields. For instance, in the academic year 1953/54, we borrowed 97 items from other libraries that we could not supply from our own shelves. In 1957/58, we requested 107 references. Last year, 1961/62, we had to ask for 777 items."¹⁷ The complexity of book selection means that well trained personnel must be added to library staffs to cope with this activity. It means larger collections and collections broader in scope. Nineteenth century medicine as a well-defined discipline no longer applies in the mid-twentieth century. It means that planning and coordination must take place among the libraries of a geographic area in order to avoid needless duplication. It means that communications systems must be improved to the point of rapid retrieval, or universities, for example, will be forced to duplicate their physical, biological, and behavioral science collections in the medical school as well as in subject departments, if they are geographically separated.

The bibliographic apparatus necessary to control the huge and ever expanding literature is being taxed to the breaking point, both from the standpoint of sheer size and from the financial burden that this size brings. "Seventy-five thousand scientific and technological journals are being published in 65 different languages and more are being born daily.

16 Kilgour, Frederick G. Personal communication.

17 Hetzner, Bernice M. Personal communication.

The total number of articles these journals print annually exceeds a million. Over 3,000 abstract journals attempt to compress the materials into manageable proportions. For example, the decennial index of Chemical Abstracts for the period 1947/57 is contained in 19 volumes of 1,200 pages each - this only the index to the chemical literature for this decade. This decennial index to Chemical Abstracts costs \$500. For the previous 10 years, the index consisted of 6 smaller volumes. In the field of chemistry, the literature is actually doubling every 7 years - that is, in the next 7 years there will be more pages published than in all the years that have gone before."¹⁸

Two striking examples will illustrate the threatened break-down in scientific bibliography. The first is the case of Chemical Abstracts, a tool which is essential in medical libraries. In 1960 the price per year of Chemical Abstracts to colleges and universities was \$80. In 1961 the price was raised to \$200. per year, the price which prevailed through 1962 also. Now, for the year 1963, colleges and universities must pay \$500. per year.

The officers of the American Chemical Society, as publishers of CA, are simply responding to economic realities. CA in 1907 published 7,975 abstracts; in 1962, 165,000 abstracts were published. It will take \$4,500,000. to produce CA in 1963; this rate is increasing by \$500,000. per year. By 1972, CA may cost \$10,000,000. to produce.

For 1963, a subscription to CA will cost the same for personal ACS members as it does for colleges and universities - \$500. For hospitals or independent libraries which do not qualify as colleges and universities, the yearly rate will be \$1,000. What happens to the hospital library whose entire budget for books and periodicals is \$4000. per year? What happens even to a medical school library such as Harvard, which must subscribe to 6 copies of CA for its various departmental libraries and branches? This means \$3,000. in 1963 as opposed to \$1,200. in 1962, and \$480. in 1960.

The second example is a new work, Encyclopaedia Chimica Internationalis, a cumulation of Index Chemicus, which is a bi-weekly index. The ECI, in 6 volumes covers the chemical literature of slightly more than 2 years. It does not supersede or replace CA; it will have to be purchased by medical libraries which purport to be first-class libraries. It costs \$1,200. for the 2-year cumulation with a 50 percent discount for educational institutions.

18 University of the State of New York. New York State Library. Report of the Commissioner's Committee on Reference and Research Library Resources. Albany, 1961. 43 p.

It seems inevitable that the bibliographic apparatus essential to the pursuit of medical research will be, within a matter of a very few years, impossibly expensive.

Progress has been made in the area of improving the traditional bibliographic tools. The mechanization of Index Medicus and the plans for the MEDLARS program at the National Library of Medicine is a case in point. These measures will increase speed of production and will increase coverage of the medical literature in Index Medicus. The scope of Index Medicus, however, reflects medicine in its narrow sense, not as it exists today in its multi-disciplinary form. A great deal of coordination is needed among the indexes and abstracting tools of the various inter-related disciplines, i.e. Chemical Abstracts, Biological Abstracts, Bibliography of Agriculture, Psychological Abstracts. Medical school libraries look to the National Library of Medicine for leadership in making progressive improvements.

2. Housing

In 1957 a survey of medical school libraries¹⁹ showed that about 55 percent of the 45 libraries reporting were filled to capacity or had exceeded their capacity. Of the 45 percent with space for growth, this space was so small that normal growth would have filled up this space between 1957 and 1962.

Only a handful of new medical school libraries has been built during the years since 1957. Much more commonly libraries have found it necessary to store large portions of their working collections in other locations, often at a distance. In one typical situation, a library has had to store all of its medical journals prior to 1900. Another library stores all of its books prior to 1920. The increased expenses involved in servicing a stored collection at a distance are obvious; the inconveniences to readers are detrimental to medical progress. Worst of all, in spite of these radical measures, the libraries are still running out of space. The Fry survey states that "there are 300,000 volumes of medical material in our libraries that seemingly are not on the shelves of the libraries owning them."

American medical school libraries double in size every 12 years. Seventy percent of medical school libraries were built more than 10 years ago; 50 percent were built more than 30 years ago. The crowded

¹⁹ Fry, A. and Adams, S. "Medical library architecture in the past fifty years". Bulletin Med. Library Assoc. 45: 471-79, Oct. 1957.

and makeshift space in which these libraries are housed presents great inefficiencies for library users and ultimately creates unwarrantable expenses for the institution, just as any activity costs more to perform in inefficient quarters than it does in efficient quarters. The problem of damage to library collections should not be ignored either. The crowding, dirt, and improper heating, ventilating, and lighting in ill-housed libraries significantly diminishes the life of the library materials. Newer features of medical libraries, such as space for storage and use of audio-visual materials, microfilm and photocopy service, and electronic data-processing equipment, must be planned for in building renovation or construction.

The Jones Committee stated "one urgent need almost all medical schools have in common is the improvement of their libraries which are essential to the functions of education, research, and good medical care. The school administrators have not considered it possible to spare sufficient general operating funds for this purpose, and support by private gifts has been meager." The Jones Committee made specific recommendations for the modernization and supplementation and the renovation and construction of medical libraries. The Fry survey showed that 88 percent of the libraries responding were planning significant alterations. Thirty-one percent needed entirely new buildings. Unfortunately the planning for significant alterations or new buildings often bears little relation to actual construction. One major library has been through 4 different sets of architectural plans over a period of nearly 20 years with never a spade turned nor a brick laid. State supported schools often plan their building construction in phases. The first phase provides the shell of the building, still highly inadequate for the job to be done. Completion may take from 5 to 15 years, during which time services are curtailed and needs will have increased greatly. Beatty in a 1962 survey of medical school libraries found that 75 percent of the libraries surveyed had an acute lack of work space.²⁰

Fry showed that the median need for space was for approximately 11,300 square feet at a cost of about \$340,000. From a sample of 19 medical schools reported to the Association of American Medical Colleges in 1958, 7 reported a need for space of 10,000 to 30,000 square feet. Letters from 24 libraries, inquiring about the Research Facilities Construction Program of the NIH, expressed acute building needs ranging in cost from \$43,000. to \$1,459,000. No grants have been made under the Program. The Bayne-Jones report of 1958 recommended the establishment by 1970 of from 14 to 20 new medical schools.

20 Beatty, William K. Personal communication.

At the new University of Kentucky Medical School, space for the library cost in the neighborhood of \$700,000. The first 70,000 volumes purchased cost \$500,000. This total figure of \$1,200,000. provides for library space and about 75 percent of the basic minimum book collection. Personnel and operating expenses, which are higher than usual during the period of initial library establishment, would increase the cost substantially.

The 6th Annual Report of the Surgeon General, Public Health Service, stated that, "Another critical area need and yet one which has had to be deferred up to the present time, is that of medical school library construction. Such libraries are indeed a 'specialized resource' for which provisions must be made in the coming years."²¹

This volume of need for physical facilities is both massive and critical. It represents a deferment of needs over the past 30 years, which has inevitably reached a point of desperation. Clearly, a way must be found to meet the present emergency.

One relatively recent development which shows some promise of tempering the great need for physical expansion of libraries is the development of the regional reservoir library. In this scheme there is created a large central resource library which bears the responsibility for collecting materials in depth and which makes its resources and services available to a broad geographic area, both to smaller medical libraries who can thus limit their collecting scope to the most-used class of materials, and to the general medical community, whether urban or rural. These reservoir libraries are or can be created often by the merging of 2 or more smaller libraries in geographic proximity. Examples of this kind of merger are the Rudolph Matas Medical Library in New Orleans, which combines the libraries of Tulane University Medical School and the Orleans Parish Medical Society; the Louisville Medical Library, supported by the University of Louisville Medical School and the Jefferson County Medical Society; and the proposed merger of the library of the State University of New York, Downstate Medical Center and the Medical Society of the County of Kings Library. The largest and most influential of these merged libraries will be the proposed Francis A. Countway Library of Medicine combining the library of the Harvard Medical School and the Boston Medical Library. Examples of regional libraries serving rural areas are seen in the projected plans of the Universities of Kentucky, Nebraska, and Wisconsin.

21 6th annual report of Surgeon General of Public Health Service, message from President of United States transmitting report summarizing activities of health research facilities program; April 2, 1962. Washington, D. C., 1962. (House doc. 375). 38 p.

New York State is considering a formalized plan for state-wide medical library coordination with a reservoir library located in New York City.

3. Expenditures

Table 2 provides quantitative data gathered for this report on the present status of library expenditures.

Deitrick and Berson reported that between 1941 and 1951 general expenditures of medical schools (excluding research) had more than doubled. Library expenditures had also more than doubled. Expenditures of funds restricted to research, however, had increased eightfold. "With an eightfold increase in expenditures on research, and the indirect costs of that research being absorbed largely by the instructional budget of the school and charged to administration and maintenance, it would seem that the libraries have not been provided with sufficient funds to meet demands placed upon them by the research expansion. When knowledge is sought increasingly, the libraries will be used increasingly. . . It would seem that an eightfold increase in research expenditures should be accompanied by much more than a doubling of the library expenditures."

"The demands placed upon the libraries by research projects have not been recognized by the administrative officers of medical schools or by agencies granting funds to support such projects. It is estimated that, in 1950/51, the allocation to the libraries of 2 percent of the funds restricted to research would have resulted in an average increase of approximately 40 percent in the total funds available for the libraries in the 59 schools."

"Little evidence was found by the Survey of attempts to meet the libraries' increased needs during a period of tremendous expansion in the research and other activities of the schools. Faculty members, research workers, and students will be severely handicapped unless the new demands placed upon libraries are met by careful administrative and budgetary planning. In a nation dependent upon medical research to a greater degree than ever before, surprisingly little is being expended on the housing of the reports of that research and on making those reports available."²²

22 Deitrick, J. E. and R. C. Berson. Medical schools in the United States at mid-century. N. Y., McGraw-Hill, 1953. 380 p.

Table 2. - Distribution of library expenditures of medical schools
in the United States, 1960-61.

Informational item	Number of institutions included	Maximum dollars reported by any institution	Third quartile	Median	First quartile	Minimum dollars reported by any institution
Total salaries and wages	79	\$ 175,953	\$ 54,945	\$ 35,573	\$ 19,300	\$ 7,290
Books and other library materials	82	89,887	27,000	19,160	11,052	4,032
Binding	80	24,561	5,000	3,700	2,370	500
Other operating expenditures	73	66,603	4,993	2,584	1,250	200
Total operating expenditures	74	259,374	94,532	51,882	20,247	9,476
Total expenditures of medical school for educational and general purposes	71	24,514,332	5,560,000	3,500,000	1,686,277	400,000
Expenditure ratio *	68	19.	2.5	1.7	1.3	.3

*Library operating expenditures as a percentage of total institutional expenditures for educational and general purposes

As we can see from our statistics, more than 50 percent of the medical school libraries have not reached the 2-plus percent ratio mentioned in the Deitrick-Berson study 10 years ago. The New York State Education Department recently named the figure 5 percent as the recommended percentage of the total general and educational costs for minimum support of college library service.²³ This coincides with the American Library Association standards. In the same publication the Department estimates the cost for good library service to college undergraduates at about \$50. per person annually. "It is estimated that the cost for good library service to graduate students is about \$500. /per person/ annually. This is because they need a far greater variety of books, and many books which are rare and expensive."²³ By these suggested standards, medical school libraries as libraries for graduate students, do not even begin to approach minimum support of their readers.

Not only is the percentage of support low, but as was mentioned earlier in this paper, it is shrinking. At Yale University School of Medicine, university appropriations to the library have shrunk from 1.9 percent in 1952/53 to 1.2 percent in 1959/60 of the total medical school expenditures.²⁴ The University of Nebraska's Statistical Report, 1959/60, shows a shrinkage of from 3.34 percent in 1953/54 to 2.75 percent in 1959/60. The State University of New York, Upstate Medical Center, reports the library's share of the Medical Center's total operating and research expenditures as 1.8 percent in 1958/59 and 1.5 percent in 1959/60.²⁵

Concurrent with shrinking support, we are faced with the increase in publication rates presented in the following graph:²⁶

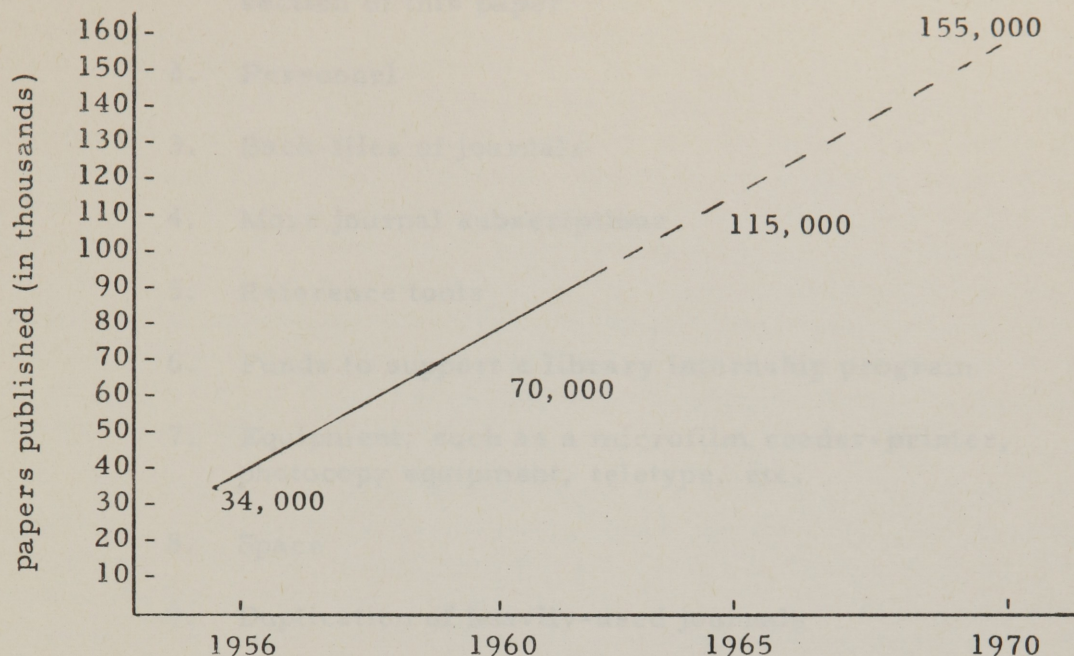
23 University of the State of New York. State Education Department. Knowledge is power. Rev. ed. Albany, 1962. 27 p.

24 Kilgour, Frederick G. Personal communication.

25 State University of New York. Upstate Medical Center. Upstate Medical Center Library Annual Report, 1961-62. Syracuse, 1962. 17 p.

26 From Therapeutic Notes 69:204, 1962.

MEDICAL RESEARCH AND THE PUBLICATION RATE



Research grants by the National Institutes of Health in 1960 approximated 715 million dollars and were productive of about 70,000 papers. This contrasts with an estimated 34,000 papers published in 1956. If NIH research grants continue to increase at the current rate, the number of research papers published in 1970 will approximate 155,000. (After Adams)

Eleven of the 12 librarians personally interviewed were asked by how much their total operating budget would have to be raised in order for them to be able to provide first-class library service in their situation. One librarian was satisfied with his budget as it stands. This is, however, the library of a new medical school, and a school which has taken its library responsibilities quite seriously. Another of the librarians would not raise his annual budget but would like a non-recurring sum of \$200,000. for the purchase of back-files of journals. This is another recently established school. Nine librarians expressed a desire for an annual increase. The most common request was to double their present budget. These requests ranged from \$100,000. to \$250,000. per year.

When asked what the requested sum would be used for, the librarians gave the following answers.

1. All of the services enumerated in the Services section of this paper
2. Personnel
3. Back-files of journals
4. More journal subscriptions
5. Reference tools
6. Funds to support a library internship program
7. Equipment, such as a microfilm reader-printer, photocopy equipment, teletype, etc.
8. Space
9. Duplication of heavily-used journals

When asked if there were any large projects in their libraries which remained unfinished due to lack of funds, the following were enumerated:

1. Reclassification of book collections.
2. Cataloging backlog
3. Work on history of medicine collections
4. Revision of serial record
5. Binding backlog

Each of these needs was stated several times. It is reasonable to assume that these needs are not common only to the group of librarians interviewed but express the needs of medical school libraries in general.

4. Services

The chief librarians of 12 medical school libraries were interviewed at length, either in person or by telephone. The purpose of the interviews was to elicit a subjective response to the question of medical school library needs from a representative group of librarians. The twelve were chosen from a variety of types of institutions and from a variety of geographical locations.

Most of the topics discussed dealt with library services. Service to readers in libraries is a difficult thing to describe either quantitatively or qualitatively, yet it is of fundamental importance. It is here that the art of librarianship manifests itself. It is dependent upon the desire and the ability of the librarian to bring the reader and his sought-for information together at the time that he requires it. Scientific and technical libraries have developed a certain sophistication in the area of reader services. This is in response to a greater sense of urgency of need in these libraries than there is in general libraries or libraries in other subject areas. The size and complexity of the literature and of the bibliographic apparatus creates a necessity to interpret and exploit the body of information. The best medical librarians are virtuosos in the area of services to readers. Training, the desire to serve, and imagination are the prime requisites.

The librarian's imagination is put to effective use only when it is supported by sufficient funds to bring ideas into reality. The medical libraries of pharmaceutical houses, for example, have exhibited greater sophistication in services generally than have the libraries of medical schools. The reason is that they are financially better supported. There are funds for more and better trained personnel, for mechanical devices to streamline routines, and funds simply to turn into action those ideas which will meet the assessed needs of the community to be served. The motivation in pharmaceutical houses is neither benevolence nor extravagance; it is simply a matter of economic self-interest. To them, cost studies have indicated that money spent in library services saves money elsewhere or makes money elsewhere. Surely, the urgency of research in a proprietary institution should be no greater than that in an academic institution.

Traditional service to readers in medical school libraries consists of the following: circulating books and journals, borrowing un-owned material from other libraries, physically locating library materials, answering short information questions from reference books, answering longer reference questions from the literature (limited), compiling short bibliographies for readers (limited), verifying references (limited), photocopying (limited), circulating lists of recent acquisitions (limited), preparing displays and exhibits (limited), instruction on use of the library (limited). This service varies from library to library depending upon the amount of time that the staff has available and the training and imagination of the staff members.

The following enumeration represents services which the 12 medical school librarians stated that they do not now offer but would like to offer if sufficient funds were available. Very few of these services are being offered by any medical school library to any extent. By way of contrast many of these services are offered in the libraries of pharmaceutical houses.

1. Continuous bibliographic service. A reader wants to be kept up to date on the literature of a particular subject. The library undertakes the searching of current indexes and abstracting journals and new issues of the important journals in the subject field, as they appear. References to the articles or photocopies of the articles are provided for the reader as they are found.

2. On-demand bibliographies. A reader needs a retrospective bibliography on a particular topic. The library undertakes the search using the appropriate bibliographic tools. The reader is provided with a copy of the bibliography.

3. Translation service. A reader needs information from an article written in a language he cannot read, or wishes to know if the article is pertinent. The library has on its staff persons who can undertake spot translations of a summary or a few paragraphs of text. Or if a formal, full translation is needed, the staff member can undertake it himself or can locate an appropriate translator.

4. Abstracting service. A reader needs an epitome of the literature on a particular subject. The library undertakes the preparation of such an epitome, perhaps in conjunction with numbers 1 or 2 above.

5. Audio-visual service. A reader needs a film or sound tape or recording dealing with a particular subject. The library can identify and locate, can buy or rent the item for him, and can provide the equipment to use it, the personnel to run the equipment, and perhaps the place to show or listen to the item. The library can also maintain an up-to-date collection of these items.

6. Delivery service. A reader at a relatively short distance from the library needs an item from the library's collections. The library is able to provide immediate delivery of the item, whether by a boy on a motor-scooter, closed-circuit television, telefacsimile, or some other modern communication device.

7. Extension service. A reader in a place remote from the library (mainly rural areas) needs an item from the library's collections. The library is able to provide rapid delivery of the item or a photocopy of the item by mail (or conceivably by one of the newer devices mentioned in number 6).

8. Rapid copying service. The library is able to provide for a reader, while he waits, a reproduced copy of the item he needs so that he can carry it away with him. The latest copying machines are available to give him the kind of copy he requires.

9. Teaching the use of the literature. The library is able to undertake appropriate teaching and instruction of readers on the effective use of the medical literature and library services. This applies to students, faculty members, research workers, hospital house staffs, and other groups. The instruction can take the form of anything from orientation tours, to occasional lectures to subject groups, to formal courses in the medical literature.

10. Services to hospitals. The library is able to perform all of its services for personnel deployed in teaching or other hospitals in a city or in a region or state. The library coordinates the purchase of library materials in the hospitals to avoid useless duplication, and in turn, provides rapid service such as that described in number 6.

11. Editorial service. The library maintains a service whereby all papers being submitted for publication pass through the library where the references are verified, the citations are checked for uniformity, and format, grammar, illustrations, etc. are checked before submission.

12. Literature assistance staff. The library is able to assign a competent staff member to any research group in the institution, as needed, to work on the literature end of any project. This could vary from full-time participation in a project to occasional consultation.

13. Liaison service. The library is able to assign a staff member with subject background and bibliographic training to act as a regular contact with various groups in the community (nurses, medical students, occupational therapists), to assess the needs of each group in the way of services and materials.

The services outlined above could be performed on a paid, self-supporting basis, or they could be partially or fully subsidized by the institution. The services could be performed with any degree of intensity. The usual difficulty is, however, that a library attempts to inaugurate one or more of these services without sufficient financial support. The result is that the service is watered-down, very selective in its performance, or downright bad. Any inauguration of library service is based on the assumption that it is something that can best be performed in a library-centered situation where well-trained librarians undertake the tasks as well or better and certainly more economically than the busy investigator himself. If this is true, then the institution must be prepared to pay the price. In a recent fund-raising effort the Harvard Medical Library put a price-tag on what it considered to be an effective, modern reference, information, and bibliographic service, embodying numbers 1, 2, 3, 4, 9, 11, 12, and 13 of the services enumerated above. The annual budget for this service provided for 4 senior

librarians, 3 junior librarians, and one clerk-typist, at \$49,300. per year. This figure is just short of the median total operating expenditures of our country's medical school libraries.

Several of the services mentioned above which involve literature searching might be more efficiently handled with electronic data processing equipment. Eight of the 12 librarians interviewed said that they had access to such equipment, and several had or are making use of this equipment in a limited way for library purposes: serial records, book charging, new book lists, experiments with the card catalog. The librarians were eager to participate in the proposed plan of the National Library of Medicine to distribute regionally duplicate magnetic tapes produced in its MEDLARS program.

Shaw has summed up very nicely the kind of service to readers which medical school libraries should be providing: "The front office should be designed to get each research worker what he needs where he needs it, and in the form in which it is most useful to him, regardless of what we have to do behind the scenes to achieve this, and regardless of how we do it. Only insofar as we achieve this objective currently and continuously can scientific information services contribute to the advancement of science."²⁷

The fact that medical libraries have not by and large achieved this objective is causing scientists to seek other ways by which to satisfy their information needs. One of these is the proposal for the development of information centers, specialized centers whose purpose it would be to provide many of the services enumerated above. The following quotation shows the scientists' disenchantment with present library services: "Biologists as well as other scientists, have encountered so many difficulties in working with the traditional library system that they have tended to neglect the use of formal published information sources and have developed a number of other devices to obtain the required information. Some biologists are not aware of the literature problem. Most biologists do not have any detailed knowledge of the new profession encompassing documentation, specialized library science, and information storage and retrieval."²⁸

27 Shaw, Ralph R. "Documentation and the individual." Science 137: 409-11, Aug. 10, 1962.

28 American Institute of Biological Sciences. Biological Sciences Communication Project. Development of information centers. Washington, D. C., n.d. 8 p.

There is a real danger here that this disenchantment with libraries, based upon frustrations generated by the literature explosion, will result willy-nilly in the creation of a brand new information network uselessly duplicating the resources of existing libraries and springing into being largely to provide the kinds of services that existing libraries should and would perform if they had proper financial support. Certainly it would be folly to create a new facility without exploiting to the highest degree the institutions which now exist for the same purpose.

5. Staffs

Table 3 presents quantitative data gathered for this report on the present status of personnel in medical school libraries.

In 1960, Brodman estimated that there are approximately 1000 medical librarians in the U. S. today.²⁹ The 1962 questionnaire, prepared for the present study, shows that there were 324 professional librarians employed in U. S. medical school libraries in 1961. "Professional librarian" is defined as an employee who "performs work requiring education, training, and skill in the theoretical or scientific aspects of library work as distinct from its merely mechanical and clerical aspects."³⁰ Almost all of these employees has a Master's or fifth-year degree from a library school accredited by the American Library Association or its equivalent. Many have graduate instruction in specific subject areas, and a small but growing number has a doctoral degree in a subject specialty or in advanced librarianship.

In medical school libraries, "a normal attrition level of 5 percent occurs, due to retirements, deaths, and permanent withdrawal from medical librarianship."²⁹ The expansion of medical schools' programs of education, research, and patient care, and the founding of new libraries also influence the manpower needs of libraries. It has been estimated that 40 new medical librarians are needed now merely as replacements, and over 100 medical librarians could be absorbed annually, including the accumulated attrition. In 1951 the median total professional librarians employed in medical school libraries was 3.³¹ In 1961 it still

29 Brodman, Estelle. Unpublished data.

30 U. S. Office of Education. College and University library statistics. /Questionnaire/

31 Medical Library Association. Committee on Criteria for Medical School Libraries. Report. Philadelphia, 1953.

Table 3. - Distribution of library personnel of medical schools
in the United States, 1960-61.

Informational item	Number of institutions included	Maximum number reported by any institution	Third quartile	Median	First quartile	Minimum number reported by any institution
Total professional employees	79	11	4	3	2	1
Total non-professional employees	79	20-1/2	6	4	2	1/2
Total hours of student assistance during year	79	10,208	3,200	2,060	1,162	0

was 3, in spite of the fact that the number of volumes which it is necessary for librarians to acquire, process, and service has risen 57 percent during the same period.

Any young, promising medical librarian today receives possibly 4 to 6 job offers per year. As the individual advances, these offers become more and more attractive, and he will inevitably accept one. Most medical school librarians are forced by economic reality to think of their junior assistants as nothing more than trainees whom they are fortunate enough to have for a brief period before they leave to accept one of the many job openings at a better salary. The mobility of personnel in this relatively small library field is alarming; the libraries suffer greatly from the resulting loss of continuity of service.

The need is hardly being met today by the recruitment and training of only 35 medical librarians per year, leaving a deficit of 65 medical librarians annually. In five years time this will result in a cumulative deficit of 325, which is almost one-third of all the medical librarians in the U. S. today.

Medical librarianship does not attract talented young people as easily as some other scientifically-related professions appear to. A good recruitment program might help to alter this. There is little or no attempt to acquaint young scientists or science students with the opportunities and satisfactions to be gained from a career in medical librarianship. There are only 9 schools in the U. S. giving courses in some aspect of medical librarianship. These are mostly summer courses, and some are offered only on alternate years. "We accept the premise that good library service is integral to medical research and education and that it is an essential support factor in good medical care. Limiting the relationship of the present status of education for medical librarians to that of medical research we find that there is not the slightest resemblance . . . Commendable and praiseworthy as these recommendations [Jones Report] are, they will not have real meaning unless there are trained, capable and efficient librarians to place them in operation . . . This is truly a dismal picture."³²

There is not only the need to recruit and teach new medical librarians, but there is the need to develop standards for medical librarianship and to keep medical librarians already in the field up to date with recent advances in some kind of an effective program of continuing education. The Medical Library Association has experimented recently with several types of refresher courses, workshops, seminars, and institutes. A

32 American Library Association. Education for Hospital and Institution Libraries Committee. Interim report. 1961.

great deal more of this is needed. Since the programs mentioned above are usually held in conjunction with the Association's annual meeting, they do not reach the grass roots of medical librarianship (approximately one-third of the country's medical librarians attend the annual meetings of the MLA) where such continuing education is probably most needed.

It is all very well to discuss recruitment, training, and continuing education of medical librarians, but in order to recruit you must have something to offer; in order to train properly you must have someone who can be properly trained, and in order to educate continuously you must have someone who can learn. The following table (Table 4) presents quantitative data gathered for this report on the present status of salaries of full-time personnel in medical school libraries.

This table also suggests qualitative data on medical school library personnel. One medical school pays its chief librarian \$4,500. One school pays a professional assistant \$3,000. Although there are 17 medical schools who pay a librarian \$10,000. or more per year, there are 42 who pay \$5,000. or less per year and 7 who pay less than \$4,000. per year.

The median annual salary of all professional medical school librarians is \$6,000. The median annual salary of U. S. college and university faculty members, all ranks, all institutions, is \$7,486.³³ The approximate annual salary of secretaries in San Francisco is \$5,278.³⁴ More than 25 percent of the professional medical school librarians in the U. S. make less per year than secretaries in San Francisco.

These salaries reflect directly the amount of concern that the medical school administration or the university library administration have in the library. The salaries also reflect the amount of responsibility delegated to the librarian and, inevitably, the quality of the librarian's performance. The chronic exasperation aroused by this state of affairs caused the following statement by a librarian who was engaged in setting up an in-service training program: "It is recommended that no attempt be made to provide workshops for poorly equipped persons employed as medical librarians. Such persons and their employers are too apt to conclude that such courses qualify participants as 'trained' medical

33 American Association of University Professors.

34 U. S. Bureau of Labor Statistics.

Table 4. - Distribution of salaries of full-time personnel of medical school libraries in the United States, 1960-61.

Informational item	Number of institutions included	Maximum dollars reported by any institution	Third quartile	Median	First quartile	Minimum dollars reported by any institution
All professional librarians (chiefs and professional assistants)	79	\$ 14,500	\$ 7,500	\$ 6,000	\$ 5,100	\$ 3,000
Chief librarian	79	14,500	9,500	7,680	6,500	4,500
All professional assistants*	68	8,730	6,032	5,400	4,800	3,000
Beginning library school grad. without experience	61	6,500	5,220	5,000	4,500	3,270
All non-professional assistants	76	4,864	3,583	3,223	3,000	2,070

* Determined from the mean of all professional assistants of each institution.

librarians. It seems harsh, but necessary, to let these people learn the hard way the difference between their kind of library service and the service a qualified medical librarian can provide."

Deitrick and Berson in their 1953 survey of medical education stated, "These research workers require also the services of highly trained librarians who are skilled in searching all the published literature for material of value to specific research problems, and are able to judge what material to purchase, what to borrow and where it can be obtained, and how to spend the limited funds that are available."³⁵ This was true 10 years ago. It is even more true today. Yet, ironically enough, we find ourselves haggling over the pitiful salaries paid to the majority of medical librarians. Would that we were over that elementary hurdle. What we should be spending our time on is the recruitment and training of talented young librarians with backgrounds in Russian and Chinese, chemistry, physics, sociology, and statistics, providing them with realistic salaries, and letting them get started on the job that is waiting to be done.

Conclusions

Medical school and university library administrators in the United States are in the process of learning the fact that the medical literature is important and that the proper management of it is complex, expensive, and essential. We are 30 years late, and some have not yet learned. Because there has been no demand for well-trained, imaginative medical librarians, there has been little formal training available, and there is no reservoir from which to pluck likely candidates for the new jobs opening up. Because expenditures have been made so frugally, medical school library collections at this time fall far short of what they should be. Catching up will be very dear, if the availability of materials makes it possible at all. Because proper maintenance has been deferred for so long, medical school library quarters are in a state of deplorable inefficiency, and the collections housed in them are being physically destroyed daily. Because of the lack of foresight, the bibliographical apparatus which is the key to information in the medical sciences has become sufficiently cumbersome and expensive as to be breaking down.

Is this not the time for dramatic action before the rates of growth with which we all must live succeed in inundating us? What we need is inspired leadership, imaginative aid, and money.

35 Deitrick, J. E. and R. C. Berson. Medical schools in the United States at mid-century. N. Y., McGraw-Hill, 1953. 380 p.

Recommendations

1. Federal funds should be made available to both existing and new medical schools for the purpose of building up their collections to a minimum adequate standard. It is suggested that this standard in 1962 be 100,000 volumes and the current receipt of 1,500 journals. If these funds were to be made available over a period of several years, an adjustment would have to be made to compensate for the rising standard. Serious consideration should be given to the limit of time for grants-in-aid. The availability of older materials, e.g., back runs of journals, will clearly determine when the money can be effectively spent.

2. Federal granting agencies should take realistic responsibility for the support of their grant programs in terms of the literature, library staff, and library services required, just as it does in terms of equivalent technicians and laboratory services required. These programs should take into account not only the impact of quantity of materials needed, but also quality. A research program in a new medical-related area will require more dollar-support than a program in a rather better established subject area. Under these programs, funds should be made available directly to the institutional library.

3. Federal funds should be made available for the support of the essential bibliographic apparatus needed in medical research. This apparatus today is breaking down. The National Library of Medicine should take national leadership in medical bibliography in its multi-disciplinary aspects.

4. A system of regional reservoir libraries should be established in the United States, encouraged and supported by the National Library of Medicine through the granting of funds, the development of an improved bibliographic apparatus, and the development of an improved communications network. The systems already proposed in Kentucky, Massachusetts, Nebraska, New York State, and Wisconsin should act as pilots.

5. If science information centers develop with the aid of Federal funds, maximum advantage should be taken of existing library resources in order to minimize useless and costly duplication.

6. Federal funds should be appropriated to initiate a vigorous program of recruitment, education, and training of medical librarians aimed at raising the standards of medical librarianship and creating a manpower pool. These funds should support and expand the Medical Library Association's present programs of scholarships, fellowships,

internships, and continuing education. In addition funds should be made available to qualified academic institutions for the initiation or improvement of their training facilities in this area.

7. Federal matching funds should be made available for the constructing, equipping, and renovating of medical school library facilities under the Research Facilities Construction Program. Federal grants to new medical schools for library construction and equipment should be provided under the proposed Educational Facilities Construction Program.

8. A program should be established whereby non-recurring Federal grants for special projects would be made available directly to medical school libraries. These would tend to be small in amount and for the purpose of catching up with existing backlogs.

9. Experimentation in new electro-mechanical and reproductive devices relevant to library problems should be encouraged and funded.

